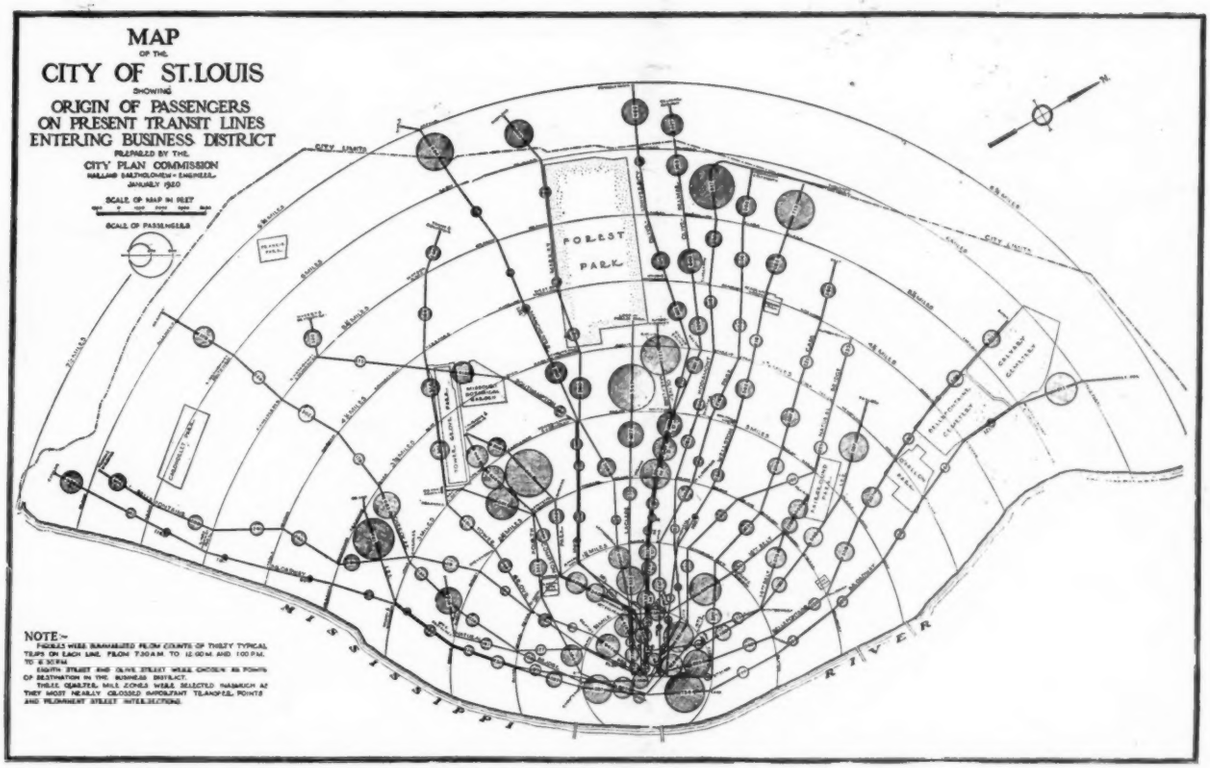
Engineering Library

MAR 14 1921

PUBLIC WORKS

CITY COUNTY STATE



RELATIVE VOLUME OF TRAVEL ORIGINATING IN DIFFERENT PARTS OF ST. LOUIS, INDICATED BY NUMBER AND SIZE OF CIRCLES

The City Plan Commission of St. Louis has submitted a report on the transit problem, which will be abstracted in our next issue. The above is one of severa instructive diagrams that accompany the report.

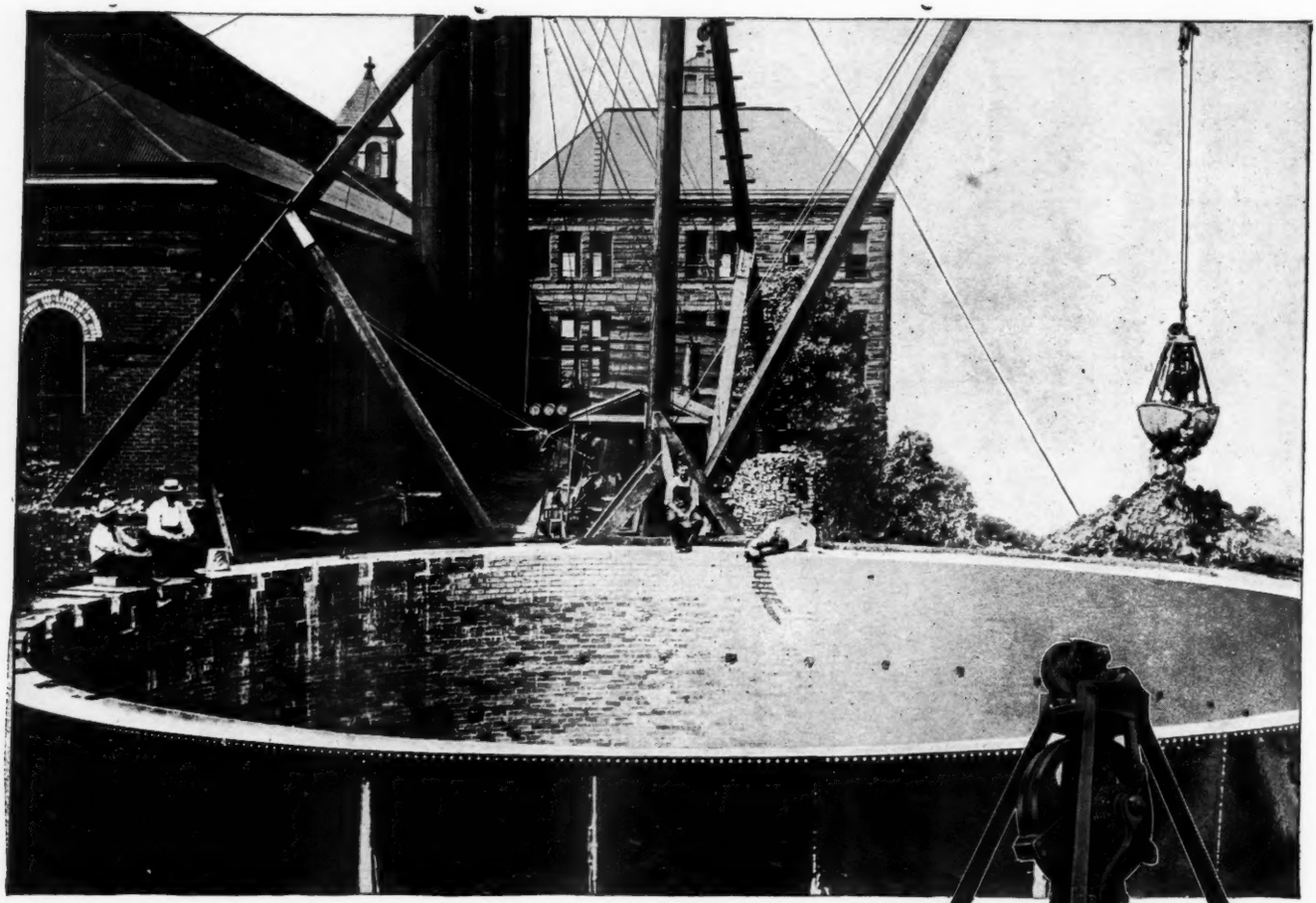
IN THIS ISSUE

The Georgetown Bridge
The Mount Pleasant Highway
Excavating Beach Sand and Loading in Trucks.
Pavements Laid During 1920

MARCH 5, 1921

PUBLIC WORKS

Hayward Buckets



For the Water Works Job

This Hayward Orange Peel Bucket—21 cu. ft. capacity—is digging a large well for the Wheeling Water Works, W. Va. Wherever there is a water works project under way, where bucket-digging efficiency and durability must ce seriously considered, you will usually find Haywards—for instance, on the Catskill Aqueduct more Hayward Orange Peel, Clam Shell and Drag Scraper Buckets were used than any other bucket on the market.

Trade HAYCO Mark

You will find a Hayward Pamphlet, which pictures and describes many interesting jobs, of real ualue. Write for it.

Hayward Standard Orange Peel Buckets are built in capacities from 2 cu. ft. up. They are ruggedly consrtucted to withstand the hardest sort of usage—and are equipped with removable steel shoes, bearings and bushings, to protect all surfaces subject to wear. All similar parts are interchangeable.

The Hayward Company, 50-58 Church Street, New York, N. Y.

Builders of Orange Peel, Clam Shell, Drag Scraper and Electric Motor Buckets

2663-Y

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Entered as Second-Class matter at the Post Office at Floral Park, N. Y., August 27, 1920, under the Act of March 3, 1879.

Vol. 50 **FLORAL PARK, MARCH 5, 1921** **No. 10**

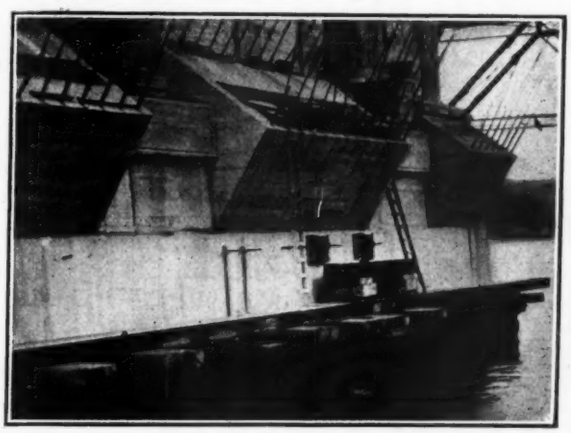
The Georgetown Bridge

$2,250,000 concrete arch structure 70 feet wide and 1,277 feet long to carry highway and trolley tracks across the Potomac on seven rib arch spans of 85 to 208 feet. Piers built in special sheet pile cofferdams. Concrete mixed in two plants.

The Georgetown bridge across the Potomac river is at the site of the famous old wooden canal aqueduct bridge built 80 years ago since replaced by steel trusses. It will connect M Street between 34th and 35th,Georgetown, D. C., with the U. S. Reservation at Rosslyn, Va. It is a monumental structure of reinforced concrete with seven segmental arch spans 85 to 208 feet long, carrying two 8-foot sidewalks, two 16-foot roadways, and two trolley tracks across the Chesapeake & Ohio canal, the street and the river at a maximum height of 72 feet from low water level to the intrados of the main arch span and 84 feet to the roadway. The main structure is 1,227 feet long and 70 feet wide and is extended to a total length of 2,700 feet by the approaches, one of which is curved 90 degrees.

The bridge, which is of a handsome type and impressive proportions, will be in the nature of a memorial to Francis Scott Key, author of "The Star Spangled Banner," whose home was near the site. It's construction was authorized by Congress in 1916 and has been provided for by appropriations totaling $2,250,000. It is being built by force account, under the direction of the Corps of Engineers, United States Army, who use for it floating equipment belonging to the War Department.

The superstructure is supported on five river piers 30 feet wide and three others of somewhat smaller dimensions, each of which carries three hollow reinforced concrete shafts about 85 feet high from low water level to the base of the parapet which protects the sidewalk on each side of the structure. The shafts are slightly battered and are ornamented by projecting courses and moldings at the spring line and at the top. The end piers form part of the abutments, having heavy longitudinal sidewalks to retain the interior fill on the sloping banks.



SKEWBACKS FOR ARCH RIBS AND SUPPORTS FOR ARCH TRUSS CENTERS.

The arch spans have three reinforced concrete ribs carrying, at the ends and on the haunches, transverse spandrel walls about 20 feet apart on centers, which support longitudinal spandrel arches. At the crown there are transverse spandrel walls about 6 feet apart which, with the spandrel arches, support the flat reinforced concrete roadway slabs.

MAIN PIERS

Each pier has triple shafts, one in the plane of each rib, with thick reinforced concrete exterior walls enclosing vertical walls covered on top by the roadway slabs. At each pier the two end shafts are duplicates and are smaller than the center shaft, from which they are entirely separate except for the top and bottom connections. The pier walls parallel to the axis of the bridge are planes and have a uniform thickness of 3 feet. The walls transverse to the axis of the bridge have a thickness of 1 foot 10¾ inches and are offset 1 foot 7¾ inches from the ends of the longitudinal walls so that the latter practically form pilasters at the corners of each shaft and additional pilasters are formed at the center points of the walls of the center shafts.

All of the walls are reinforced with ½-inch square vertical and horizontal bars near each surface. In the main piers the shafts are 30 feet wide in the direction of the bridge axis; the outer ones are 11 feet wide and the center one is 21 feet wide transverse to the bridge axis. The feet of the shaft walls are seated in recesses on top of the piers, and are filleted out to give them bearings about twice as great as the normal cross section of the wall.

MAIN ARCH

The center ribs of the main arch have a width of 21 feet transverse to the bridge axis and the side ribs have widths of 11 feet. The ribs, 11 feet 6 inches apart in the clear, are connected by deep trasverse braces 18 inches thick and about 20 feet apart. The vertical thickness of the rib at the crown is 5 feet 6 inches and the radial thickness at the skewback is 9 feet 6 inches. The clear span of the center and largest arch is 208 feet, and the rise of the intrados is 62 feet. The radius of the intrados is 108.8 feet at the crown and 142.5 feet at the haunches while that of the extrados is 124.8 feet at the crown and 148.7 feet at the haunches.

Each half of the arch rib is made with twelve sections numbered according to the sequence of construction from the crown down 1, 3, 5, 7, 9, 11, 10, 12, 8, 6, 4 and 2. Section 12 is a key section only about 3 feet thick which separates sections 8 and 10 forming construction joints with them. Section 13 also about 3 feet thick is the crown key with construction joints between it and sections 1-1, on opposite sides. The skewback bearings, radial to the arch curve, are recessed in the solid pier concrete to engage a shoulder of the arch rib.

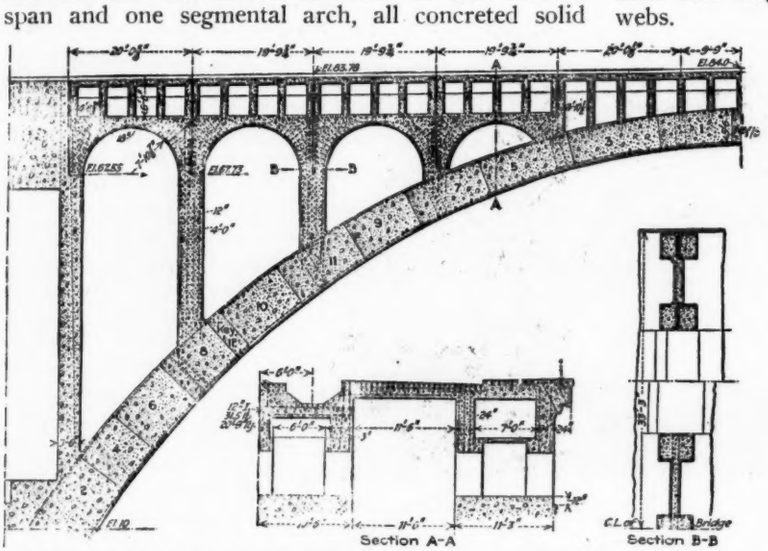
The arch ribs are reinforced by horizontal rods and rods parallel to the intrados and extrados that overlap successive sections. The lower ends of the vertical spandrel walls projecting a little beyond the extrados are connected integral with the sections of the arch ribs that support them and are bonded to them by bent reinforcement rods parallel to the arch ribs and parallel to the wall.

The spandrel walls support three full centered reinforced concrete arches of about 15 feet 10-inch span and one segmental arch, all concreted solid over the haunches to the horizontal surface at about the same elevation as the extrados at the crown. This forms a platform about 80 feet long, from the extremities of which at the haunches to center of the span there are, on top of the inch ribs, 12-inch transverse walls 4 feet 10½ inches apart at the centers. These walls carry the reinforced concrete floor slab 10 inches thick that is continuous from end to end of the bridge and from side to side, spanning the spaces between the arch ribs and provided with transverse expansion joints supported on double posts at the ends of the spandrel arches. Over the center rib there are depressions in the floor for the electric railway tracks, and the roadways and sidewalks are elevated sufficiently for drainage purposes. The other spans are similar to the center span.

CONSTRUCTION OF SUBSTRUCTURES

The excavation for the south abutment was carried down through 60 feet of old earth fill and to rock at the depth of 91 feet, the pit being sheeted and heavily timbered to resist the earth pressure from the steep hillside. Although there was a clearance at the surface of the ground of 3 feet between the neat line of the concrete and the face of the excavation when the work was started, the earth pressure was so great that it moved the entire timber framework 3 feet down hill and compressed the 12 x 12-inch waling timbers to a thickness of 6 inches where they took bearing against the horizontal cross struts.

The river piers were built on solid rock originally covered with 3 or 4 feet of mud and about 22 feet of water. They were constructed in 45 x 103-foot cofferdams, made with special combination sheet piles braced by an interior wooden framework. The piles were designed to utilize for preliminary temporary service part of the structural steel designed for permanent use in the roadway platforms. The male units were simple 12-inch, 31.5-pound I-beams with their flanges engaging recesses in the female units each of which was composed of two 7-inch channels with flanges turned in and a 5 x 5-inch full length wood filler bolted between their webs.



LONGITUDINAL VERTICAL SECTION THROUGH CENTER RIB OF 208-FOOT ARCH SPAN

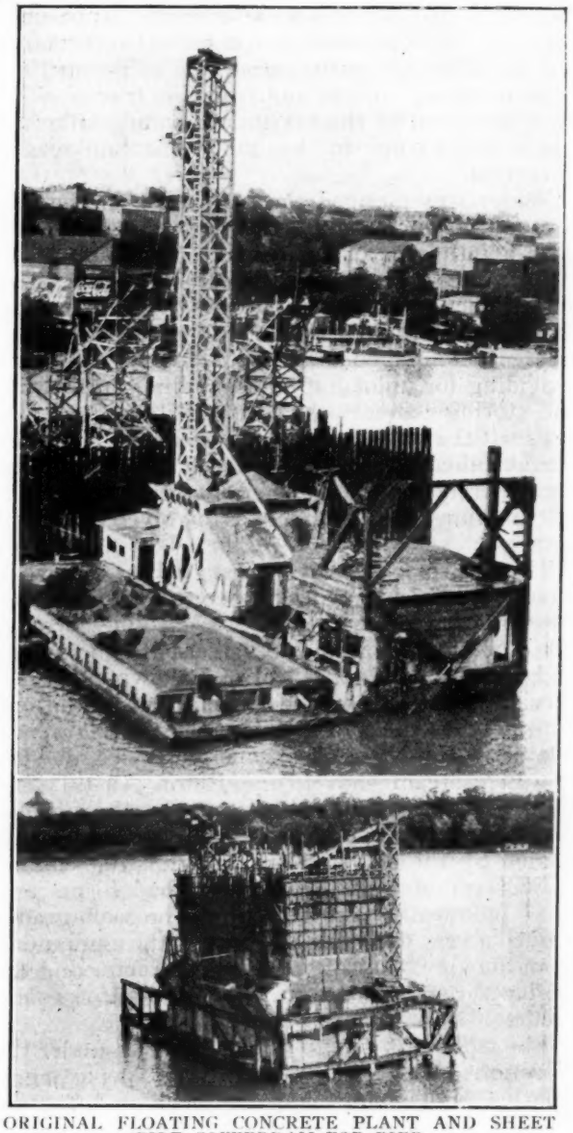
The cofferdam frameworks, requiring about 90,000 feet of timbers B. M., were completely framed and finished on shore, launched from ways, towed to position and sunk. Afterwards the sheeting around the frame work was driven by a hammer installed in the swinging leads of a floating pile driver. Tide holes 8 inches in diameter were provided for safety and the mud and gravel in the bottom of the cofferdams were removed by an airjack, after which the cofferdams were sealed by depositing a 3-foot bed of concrete under water through a tremie. After the concrete had set the cofferdams were pumped dry in about six days each, using one

8-inch and one 5-inch pulsometer and one 6-inch Emerson pump. Afterwards they were kept dry by use of a single 5-inch pump.

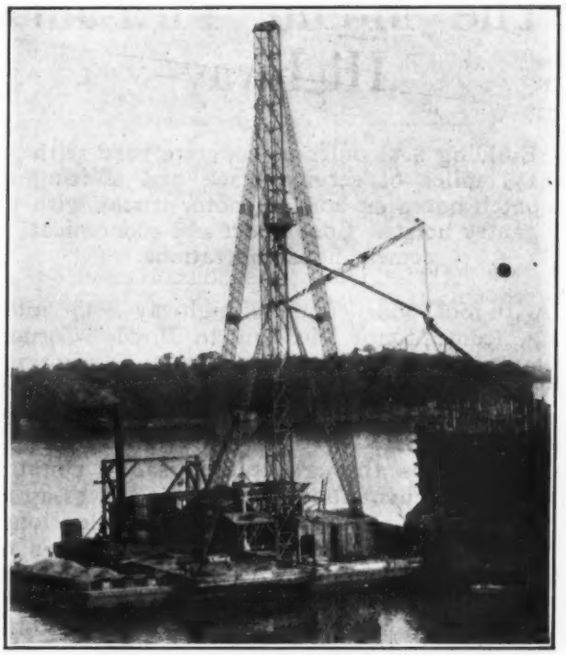
CONCRETING

The piers were concreted in the dry and were built with heavy wooden forms handled by the floating derricks and the cable way and shifted upward as the work advanced.

Concrete was mixed in a plant on shore and delivered by a bucket operated by a Lidgerwood cableway of 1,700 feet clear span with stationary wooden towers 145 feet high. Additional concrete was mixed in a floating plant equipped with a 140-foot steel tower and sliding hopper with boom and truss spout line manufactured by the Insley Company. The pumping plant was installed on a boiler scow and there were in addition two derrick scows. Compressed air for the pulsometers and for pneumatic tools were furnished by one Ingersoll-Rand compressor. The floating concrete plant was equipped with a wooden hoisting tower and chute from which the concrete was in some cases spouted directly to position in the forms.



ORIGINAL FLOATING CONCRETE PLANT AND SHEET PILE COFFERDAM FOR PIER



PREST IMPROVED FLOATING CONCRETE PLANT

The skewbacks for the arch ribs were concreted integral with the piers and reinforcement rods parallel to the arch rib were left projecting from them to bond with the ribs.

The construction of the superstructure will be described next week.

The bridge is being built under the direction of Chief of Engineers, United States Army, Major M. C. Tyler, district engineer, and Major L. E. Oliver, resident engineer in charge of all field work.

Chicago's Paving Program

The Department of Public Works and members of the Council of Chicago have practically decided upon a repaving program covering 50 miles of streets on which there will be spent in 1921 approximately $5,000,000. The first step has been taken in advertising for bids for 7 miles of highways estimated to cost about $700,000. Council has appropriated $1,000,000 in the annual budget for the repaving work, with the idea that this would be replaced by a part of the $5,000,000 which it is expected to raise by a short-term repaving loan, when this shall have been approved by the legislature.

Amending Indiana Road Law

Senator Cann of Indiana has introduced a bill for amending the present road law of that state so as to require the county to pay half of the cost, the township 25 per cent and the abutting land owners 25 per cent, and requiring 200 petitioners instead of 50 to secure a road improvement. It was stated in the discussion that under the present law persons in cities or towns can force a county to improve a county road leading into that city. The present county unit law was passed in 1919 and has met strong opposition from the farmers over a considerable part of the state.

The Mount Pleasant Highway

Building 3.43 miles of concrete road with 1½ miles of service track and shifting batch boxes on and off motor trucks with gantry hoists. Convenient and economical cement house operations.

A 16-foot wide concrete highway 3.43 miles long, from Mount Pleasant to Boyds' Corner, Delaware, is a state aid job known as Contract CN-1, which was awarded last spring to Field, Barker & Underwood, Philadelphia, at a price of about $150,000.

The road is through rolling, sandy country with an alignment about 50 per cent curves up to 2 degrees, and tangents up to 1½ miles long. The construction involves 6,400 cubic yards of 1:2:4 concrete containing 10 per cent by volume of hydrated lime, and requiring 10,000 barrels of cement, 5,000 tons of sand and 9,000 tons of stone.

All of the materials are delivered by rail and the cement is stored in a cement house with a capacity for 6,000 bags of cement and 27 tons of lime. At one end of the cement house and on the same center line, there are a stone and a sand storage bin with capacities of 6 carloads and 3 carloads, respectively. Under the floor of the bins there is an 8 x 8-foot tunnel 125 feet long, in which the batch boxes are loaded through gates in the bottom of the storage bin.

In the cement house, in line with the gates in the stone and sand bins, there is a long open cement bin with three 6-batch cement boxes placed to correspond with the cars in the service train and provided with numerous gates discharging into a 3-bag trolley hopper that is easily set under any of the gates and, when filled, can be discharged into three of the batch boxes, moved to a convenient gate for refill, and then run back to fill the remaining batch boxes in the train, after which the train of batch boxes on flat cars is hauled out by a line operated by a hoisting engine and the cars are spotted under the stone and sand bins to receive the remainder of their charges, when they are hauled away by the gasoline locomotives, or by trucks.

Because the length of highway to be constructed is comparatively short, the work urgent, and new equipment expensive and difficult to obtain promptly, the contractor devised a plan to distribute concrete materials from the storage plant to the end of the line with the equipment on hand that did not provide for a service track the full length of the line.

The track was laid 1¼ miles from the stone storage yard and materials were hauled over it to the concrete mixer in the usual manner until the mixer progressed beyond the end of the track. The track was then moved ahead of the advancing mixer, and the materials transported from the loading plant to the end of the track in the regular batch boxes, loaded on industrial cars, the car and its load being hauled on motor trucks and trailers. This enabled a small equipment of railroad track and a small one of motor trucks, neither of which was sufficient for the entire work, to be advantageously combined and execute the work without involving additional installation of plant.

At the loading plant an elevated track was built from which the cars were run directly on to the trucks. The trucks and trailers were equipped with industrial track bolted to their platforms, the spaces between truck and trailer and trailer and elevated track being bridged with removable sections of track.

After the cars had been locked in position, the truck proceeded over the completed section of concrete road, which had been cured the specified time (30 days). At the end of this section the cars were transferred to another elevated track, from which they were hauled to the mixer by gasoline locomotives in the usual manner. A truck with its trailer carried four cars, each loaded with two 4-bag batches, or a total of eight batches per load. This method gave excellent satisfaction and no delay was experienced due to the method of transferring cars to and from the trucks. The best day's run of the season was made after the combination truck and locomotive haulage was in operation.

Water was pumped the full length of the line through a 2-inch main supplied from a well, and with a full force of 50 men the maximum progress on the work was 425 linear feet daily. The arrangements for handling the aggregate and those described in the cement house were considered advantageous and satisfactory, the latter providing for unloading and handling, measuring and storing cement at a cost of 75 cents per 100 bags, all the work being done with two men that would otherwise have been required to be on hand merely for unloading cars, so that their service in filling the batch boxes involved no extra cost.

The principal equipment installed for this work included one 3-bag Koehring concrete mixer, one 3-ton and one 6-ton Plymouth gasoline locomotives, 64 ½-yard Lakewood steel batch boxes, 28 Lidgerwood cars, 6,000 feet of Lakewood 24-inch service track with steel ties, one 3½-ton and one 6-ton Clydesdale automobile trucks, two trailers, one 1-ton Ford truck for general service, one 22-ton Erie steam shovel, one 10-ton Austin road roller, one American scraper and six wheel scrapers, one Austin scarifier, one heavy rooter plow hauled by the steam roller, one hoisting engine, 16,000 feet of Blaw-Knox steel road forms and one Lakewood sub-grader. The sub-grader proved a very desirable addition to the equipment, from the viewpoint of both the contractor and the engineer, as it insured an accurate, uniform subgrade.

The work was designed and executed under the direction of the State Highway Department, Charles M. Upham, chief engineer, and Samuel Knopp, principal assistant.

PUBLIC WORKS.

Published Weekly
by
Municipal Journal and Engineer, Inc.
Publication Office, Floral Park, N. Y.
Advertising and Editorial Offices at 243 W. 39th St.,
New York, N. Y.

Subscription Rates

United States and Possessions, Mexico and Cuba....$3.00 per year
All other countries .....$4.00 per year

Change of Address

Subscribers are requested to notify us promptly of change of address, giving both old and new addresses.

Telephone (New York): Bryant 9591
Western office: Monadnock Block, Chicago

A. PRESCOTT FOLWELL, Editor
FRANK W. SKINNER, Associate Editor

CONTENTS

THE GEORGETOWN BRIDGE—Illustrated 203
Chicago's Paving Program 205
Amending Indiana Road Law 205
THE MOUNT PLEASANT HIGHWAY 206
EDITORIAL NOTES 207
Writing for Technical Papers—Government Construction Careers
Day Labor Highway Construction 208
Two Large Dams Proposed in the West 208
City and County Hog Farm for Buffalo 208
Passaic Valley Sewer Injunction 208
Patrol Maintenance for Indiana Roads 208
PAVEMENT LAID DURING 1920—Table 209
HOW CAN BEACH SAND BE MOST ECONOMICALLY EXCAVATED AND LOADED IN TRUCKS?—Illustrated 211
A Water Works Wireless 213

Writing For Technical Papers

"Aside from scholastic training and his practical experience in industry or in the field, nothing contributes more to the progress of a young engineer than to form the habit of making acceptable contributions to the technical press.

"In the first place, it clarifies his ideas, leads him to think along logical connected lines, enlarges his vocabularly, teaches him precision in the use of terms and frequently forces him to fill in certain gaps in his knowledge or experience before he can give definite, comprehensive treament to any theme."

This advice was given by C. A. Tupper, president of the International Trade Press, at a conference held by the American Association of Engineers in Chicago, February 25th, and was supported by the citing of specific instances in which young engineers could trace directly to their contributions to technical papers a rapid advance to high position and salary. The preparing of such articles increases the writer's ability as an engineer, even if they are not published; and the publishing of them gives him a favorable publicity likely to lead to advancement in his present position or to facilitate his obtaining a better one.

The mere describing of commonplace matters neither increases his comprehension of a useful subject nor leads to the publication of the articles; but almost any engineer can find something of interest to write about. It may be a novel idea employed by the contractor or a development in engineering design. A comparision of the efficiency and cost of two or more methods of handling dirt or concrete on the same or similar jobs, or of the use of the same equipment or method under different conditions, furnishes a subject for investigation that is of great value to the engineer and furnishes material for an article of interest to others.

Articles of this kind are always most acceptable to this paper and are paid for by us; but the greatest value the writer obtains from preparing them is the training involved in his study of the subject and the publicity which he receives. In fact, this is the only form of advertising that an engineer can profit by. Those who do not employ it are neglecting a most valuable agent for their advancement.

Government Construction Careers

The largest and most vital interest in this country, exceeding even agriculture, is construction. It employs millions of workers and expends billions of dollars annually. It dominates, promotes, limits, delays or expedites all branches of production, manufacture, industry, transportation and commerce and is the essential of all progress and prosperity.

A very large proportion of construction is directed by federal, state, municipal and other public officers. The people's money used for this construction is expended for the people's good in a complicated manner, exposed to innumerable dangers from dishonesty, carelessness, neglect, extravagance, inefficiency and other evils.

The work is directed by thousands of officials, most of whom are underpaid in comparison with corresponding employees of private business and are largely at the mercy of political dictation, subject to promotion or removal without reference to their abilities or efficiency and having no certainty of appreciation or even of permanent employment. They have little material incentive to high or sustained achievement, although they are in positions to save or lose hundreds of times the amounts of their salaries. The turnover of public employees is great and should be largely eliminated.

In a recent address, Judge W. W. Warwick, Comptroller of the Treasury of the United States, strongly advocated that the public service be made a life career for the ablest young men. Associations of engineers, architects, contractors, educational institutions and all civic, technical and commercial organizations should urge that employees in public construction be appointed and retained solely on their merit, be discharged only for cause, and be advanced in proportion to their increased efficiency alone. They should receive compensation that, considered with regard to the responsibility, skill, surety of payment, prestige, dignity and other conditions involved, compares with that paid for similar services in private work.

In proportion as this is accomplished we will have prompt, efficient public construction excellently and economically executed. At present there is too much cause for the warning often

given to young men to avoid public office because it destroys their initiative and ambition, often leads to carelessness, unfits them for competitive work and may at any time leave them stranded.

Day Labor Highway Construction

In his report for the last quarter of 1920, A. R. Hirst, state highway engineer of Wisconsin, stated that "all the day labor jobs directly under control of the highway commission have been completed except project No. 140" and that the results have been very gratifying.

"The experience gained in these day labor operations is invaluable in that it gives the commission an insight into construction that could not be gained in any other way. The experience gained does not, however, prejudice the commission aginst contract work. It tends rather to make the commission more appreciative of the difficulties encountered by contractors and the experience gained by the commission in these day labor operations will be he best guarantee of fair profits to contracors who are willing and able to give due return therefor."

Two Large Dams Proposed in the West

Two unusually large irrigation propositions have recently reached the point of serious discussion, one of these being the construction of a retaining dam and diversion dam that would provide for irrigating 815,000 acres in the lower Rio Grande Valley; the other being the damming of the Colorado river by means of a dam nearly twice as high as any that has yet been constructed in the world.

The Rio Grande dam would be built in the Big Bend district 700 miles above the mouth of that river, where walls of solid rock rise 1,000 feet from the bed of the river on either side. The dam would be 250 feet high.

The Colorado river proposition has been reported on by Arthur P. Davis, director of the Reclamation Service of the United States. After an examination of several hundred miles of the river, he has recommended that the dam be located about 100 miles below the Grand Canyon. The dam would be more than 500 feet high. The Canyon here is 320 feet wide at the base and 750 feet wide at the level of the top of the proposed dam, thus being no wider than the site occupied by the Roosevelt dam, but the dam would be nearly twice as high. There would be the added difficulty that the foundation below the bed of the stream must be excavated for and built during eight months of low water, since during the spring floods any temporary works would be swept away and any excavations would be filled up. Mr. Davis says that bed rock would probably be found about 100 feet below the bed of the stream. This dam would back water up the Colorado river nearly 100 miles and thus nearly up to the Grand Canyon. The water would also back up many canyons leading off from the Colorado River Canyon on both sides. In fact, the principal storage basin would be in the valley of Virgin river, which flows into the Colorado river from the Nevada side. This would provide irrigation for lands requiring it up to 300 miles distant. In addition it would regulate the flow of the lower Colorado, thus eliminating the ever possible danger of overflowing the country along its lower stretches.

City-County Hog Farm For Buffalo

A hog farm to be operated jointly by the city and county has been proposed by Frank C. Perkins, Commissioner of Public Affairs of Buffalo. Mr. Perkins claims that the hog farm where Buffalo's garbage is now disposed of owes the city about $17,000 on its contract and that the price guaranteed to the city by the contract would pay little more than the cost of motor service required to deliver the garbage from the city to the farm. The price per ton depends upon the market price of hogs from month to month, and this makes the profit of the contract to the city all the more unreliable. Mr. Perkins recommends that the county receive the garbage from the city and feed it to hogs raised on the county farm, the work being done by the prisoners kept there.

Passaic Valley Sewer Injunction

An injunction suit brought by New York City to restrain the Passaic Valley Sewerage Commission from carrying the outlet of its sewer into New York bay at Robbins Reef, has been making its way slowly through the courts, and was before the United States Supreme Court in Washington on January 26. The case for New York was handled by Charles E. Hughes, while that for New Jersey was handled by George W. Wickersham, supplemented by Adrian Riker. It is expected that a decision will be handed down by the court some time in April or May.

The main point made by the New Jersey counsel was that the pollution which the Passaic Valley sewer would cause in New York harbor would not be nearly so great as that caused by New York City itself and that New Jersey has as much right to contribute its share to the pollution as had New York; coupled with the statement that New York discharges its sewage into the Hudson and East rivers and thus into the harbor with no treatment whatever, while the Passaic Valley sewage will be subjected to sedimentation, screening and chemical treatment also if this should be deemed necessary. While New York is now discharging some 900,000,000 gallons a day of crude sewage into the harbor, the Passaic Valley sewer would discharge less than one-tenth of this amount of clarified sewage effluent.

In its plea, New York stated that the Metropolitan Sewerage Commission and the Sewerage Plan Commission favored a disposal plant at Red Hook to cost more than $32,000,000, while an artificial island was proposed for another plant at a cost of more than $41,000,000. No definite steps, however, have been taken towards carrying out either of these projects.

Patrol Maintenance For Indiana Roads

It is reported that a bill will probably be passed by the Indiana State Legislature making radical changes in the present methods of maintaining county highways. It is estimated that more than $12,000,000 is spent by Indiana counties in main-

taining county roads and that a large part of this money is wasted because political influence largely dictates the selection of county road superintendents, the men filling these positions often being incompetent and even entirely unfitted for the work.

The plan proposed would do away with the present county road superintendents and substitute commissioners of county highways. Special educational requirements would be fixed by a state board for such commissioners and all applicants for positions as commissioner of highways would be required to pass an examination fixed by the board. The board would then certify to the county commissioners of a given county the names of three persons passing an examination for commissioner of county highways and one of these would be selected for the place. The county highway commissioner would have charge of road maintenance, which would be performed under the patrol system.

The act would also provide that all rules and regulations adopted by county highway commissioners must be approved by the state board.

It is estimated that the cost of maintaining improved county roads would average about $250 a mile the first year, or $7,500,000 for the 30,000 miles of improved highways in the state. After the first year, however, the amount required would decrease.

PAVEMENT LAID DURING 1920

(Quantities are square yards or miles unless otherwise indicated.)

Cities and States	Tar Macadam	Amiesite	Granite or other Stone Block	Brick or Clay Block	Creosoted Wood Block	Concrete Reinforced	Concrete not Reinforced	Plain (water-bound) Macadam	Gravel	Cement Sidewalks
New Jersey:										
Bordentown						3,341				1,000b
Camden			11,762				2,500			1,000
Clifton										29,750§
Elizabeth			8,208.3b							
Garfield							6,603			67,508§
Highland Park						60,000				2
Madison							5,700			200b
Montclair										2,500
Newark			15,325	144		24,377				
New Brunswick				583						
Passaic			775							
Plainfield										10,000§
Red Bank						3,740				
Ridgefield Park	11,775	23,950				9,290				
Rutherford	3									½
Westfield				1,200				16,000		160§§
West Orange	1	1½	2							2
New York:										
Binghamton					10,601.24	3,330.71				
Bronx			179,581.1				6,167.3			
Brooklyn										225,000§
Buffalo			6,563	3,525	2,436					96,400§
Corning										872§§
Endicott										21,000§
Geneva			415	1,500						
Herkimer						8,250	100		5,000	3,090§
Hudson Falls				11,000			20,000			2,400§
Little Falls	1,248					8,224				
Manhattan			59,523		1,269					
Niagara Falls				5,217						
North Tonawanda								5,500		25,500§
Ogdensburg								11,000		
Olean				2.37						
Oneonta									½	2,297
Rochester							512			
Rockville Center							1			
Salamanca		2,637		11,870					15,000	25,000§§
Tarrytown								3,000b		500
Troy						7,000				
Watertown				666		1,440	1,350	22,000		
Watkins									3,000b	
North Carolina:										
Asheville							1,213			
Durham			5,182	8,946						11,200
Fayetteville			3,500							5,000
Greensboro							5			8
North Dakota:										
Bismarck						35,000				
Minot									1½	
Valley City									8,500	
Ohio:										
Akron	35,000			62,000	14,500		4,930			80,000
Alliance				39,000		330	2,390			500
Bucyrus	1,200									1
Chillicothe									1.3	8.0
Columbus				0.7			0.1			
East Liverpool				16,000						
Findlay				1,418						
Fremont				9,800						14,000§
Lancaster				12,600						
Lorain				7,700		3,400				1,000
Marietta				0.75						
Marion				22,900						
Troy									70,000	16,000§
Xenia				10,600			2,500			
Zanesville				11,100						
Oklahoma:										
Altus										1½
Bartlesville	13,627						46,730			
Durant				8,600						
Enid							47,278			
McAlister				10,324.3			2,843.5			
Oklahoma							25,605.9			3,747
Wagoner										2,000§§

PAVEMENT LAID DURING 1920 (Continued)

Cities and States	Tar Macadam	Amiesite	Granite or other Stone Block	Brick or Clay Block	Creosoted Wood Block	Concrete Reinforced	Concrete not Reinforced	Plain (water-bound) Macadam	Gravel	Cement
Oregon:										
Astoria	.....	.....	.....	.....	.....	.....	19,991	.....	.....	.....
Corvallis	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,520§§
Eugene	.....	.....	.....	.....	.....	.....	22,000	.....	2,000	5
Salem	.....	.....	.....	.....	.....	.....	8,444	.....	.....	80,000§
Pennsylvania:										
Allentown	.....	.....	.....	1,480	.....	3,516	.....	.....	.....	1.63
Altoona	.....	.....	.....	14,860	1,560	1,350	.....	.....	.....	.....
Berwick	.....	.....	1,760	.....	.....	.....	.....	.....	.....	2,000
Bethlehem	29,360	1,393	.....	4,410	.....	26,691	.....	.....	.....	11,999
Bloomsburg	.....	.....	.....	2,250	.....	.....	.....	.....	.....	.....
Bowmanstown	.....	.....	.....	.....	.....	½	.....	.....	.....	.....
Connelsville	.....	.....	.....	11,475	.....	.....	.....	.....	.....	.....
Duquesne	.....	.....	6,873	2,583	.....	7,437	.....	.....	.....	.....
East Bangor	.....	.....	.....	.....	.....	.....	.....	.....	4,000	.....
Easton	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000b
Freeland	.....	.....	.....	.....	.....	.....	.....	.....	5,000	1,200
Gallitzin	.....	.....	.....	5,000	.....	.....	.....	.....	.....	.....
Huntington	.....	.....	.....	1,500	.....	.....	.....	.....	.....	.....
Johnstown	.....	.....	.....	8,264	.....	.....	.....	.....	.....	.....
Lebanon	.....	.....	.....	.....	7,514	7,216	.....	.....	.....	56,000§
Morristown	5,700	1,700	.....	3,300	.....	.....	.....	.....	.....	.....
Parkesburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	206
Rankin	.....	.....	.....	7,300	.....	.....	.....	.....	.....	2,500
Scranton	.....	.....	653.6	414.1	.....	.....	.....	.....	.....	.....
Sharon	.....	.....	.....	.....	.....	.....	8,989	.....	.....	5,000§
Stroudsburg	.....	.....	.....	.....	.....	4,500§§	.....	.....	.....	.....
Titusville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg	.....	.....	.....	1,242	.....	1,154.4	.....	.....	.....	.....
York	.....	.....	.....	1,009	.....	.....	.....	.....	.....	.....
Rhode Island:										
Bristol	10,900	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Woonsocket	.....	.....	25,280	.....	.....	.....	.....	.....	.....	1,080
South Dakota:										
Rapid City	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,000§
Sioux Falls	.....	.....	.....	.....	.....	.....	5,003	.....	.....	.....
Tennessee:										
Cleveland	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500
Dyersburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Texas:										
Amarillo	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000§§
Beaumont	.....	.....	.....	.....	.....	.....	.....	.....	25,000	100,000§
Belton	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
Brownwood	.....	.....	.....	.....	.....	.....	.....	5,500	5,000	1,500
Clarksville	.....	.....	.....	.....	.....	.....	.....	.....	400	782
Cleburne	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,000§
Dallas	.....	.....	.....	.....	.....	.....	1,785.1	.....	5,636	362,432§
Longview	.....	.....	.....	12,000	.....	.....	.....	.....	.....	.....
Porth Arthur	.....	.....	.....	.....	.....	.....	.....	.....	.....	½
San Angelo	.....	.....	.....	.....	.....	.....	.....	.....	10,500	6,000§
Temple	.....	.....	.....	5,000	.....	.....	.....	.....	25,425	18,220§
Waco	2	.....	.....	.....	.....	.....	.....	.....	20	10
Weatherford	.....	.....	.....	.....	.....	.....	.....	.....	4	1½
Utah:										
Ogden	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000
Provo City	.....	.....	.....	.....	.....	.....	34,908	.....	.....	6,105.4§
Salt Lake City	.....	.....	.....	.....	.....	.....	31,391.6	.....	.....	.....
Vermont:										
Burlington	½	.....	.....	.....	.....	.....	.....	.....	½	2
Middlebury	.....	.....	.....	.....	.....	.....	2,200	415	415	700§§
Montpelier	.....	.....	.....	.....	.....	900	.....	.....	.....	.....
Springfield	.....	.....	.....	.....	.....	.....	.....	.....	37,500	.....
St. Albans	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Virginia:										
Charlottesville	6,000	.....	.....	.....	.....	.....	8,000	.....	.....	600
Clifton Forge	.....	.....	.....	.....	.....	.....	.....	2,000	.....	.....
Danville	.....	.....	3,200	2,466	.....	.....	16,000	.....	.....	4,862
Hampton	.....	.....	.....	.....	.....	.....	.....	.....	.....	150
Newport News	.....	.....	.....	.....	.....	.....	14,354.06	800.2	.....	.....
Norfolk	.....	.....	91,083	.....	496	.....	.....	.....	.....	.....
Washington:										
Charleston	.....	.....	.....	.....	.....	.....	6,000	.....	.....	100
Okanogan	.....	.....	.....	.....	.....	.....	.....	29,013	15,466	1,010
Olympia	.....	.....	.....	2,118	.....	.....	26,977	.....	.....	24,543
Raymond	.....	.....	.....	.....	.....	.....	3,000	.....	.....	2,000
Seattle	.....	.....	.....	46,153	.....	.....	277,365	.....	.....	.....
Spokane	.....	.....	.....	.....	.....	.....	2,923	.....	.....	4,989
West Virginia:										
Parkersburg	.....	.....	.....	4,723	.....	5,832	11,746	.....	.....	.....
Wisconsin:										
Augusta	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,000§
Baraboo	.....	.....	.....	5,000	.....	.....	.....	.....	.....	.....
Beaver Dam	.....	.....	.....	.....	.....	.....	.....	½	.....	1
Beloit	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Delavan	.....	.....	.....	.....	.....	8,000	4,000	.....	.....	.....
Eau Claire	.....	.....	.....	.....	.....	10,613	3,658	.....	.....	5,000§
Kaukauna	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Madison	.....	.....	.....	.....	.18	1.59	.....	.....	.....	.....
Manitowoc	.....	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Marinette	11,800	.....	.....	.....	.....	.....	.....	.....	.....	4,800
Oshkosh	.....	.....	.....	.....	.....	.....	.....	.....	10,000	3
Racine	.....	.....	.....	37,664	.....	.....	.....	.....	.....	3
Rhinelander	.....	.....	.....	.....	.....	.....	.....	5a	.....	.....
Sheboygan	.....	.....	.....	.....	.....	6,100	.....	.....	.....	1
Superior	.....	.....	.....	.....	.....	26,000	.....	.....	.....	150,000§
Waukesha	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000§§
Wisconsin Rapids	.....	.....	.....	.....	.....	.....	.....	.....	1.8	1.5
Wyoming:										
Cheyenne	.....	.....	.....	.....	.....	.....	415	.....	.....	15,099b

¶—Information furnished by manufacturers. §—Vibrolithic. †—Cubic yards. §—Square feet. ‡—700 Topeka on stone base; 3000 on concrete base.]*—5 ft. wide. ††—5381 lineal feet, 30 ft. wide, asphalt filler; 3572 lineal feet, sand filler. §§—Feet. a—Blocks. b—Lineal feet. c—Dollars.

Construction Questions Answered

How Can Beach Sand be Most Economically Excavated and Loaded in Trucks

For given conditions drag-line scraper bucket operated on a 400-foot slack cable is probably simplest and cheapest. With modified requirements and under special circumstances, dredges, conveyors, derricks, graders, wagon loaders, plows, cableways and steam shovels might be advantageous.

Office of County Surveyor, Ohio,
January 21, 1921.

Editor of PUBLIC WORKS:

Dear Sir: Along the beach of Lake Erie we have several places, such as shown on the enclosed sketch, where good, clean, sharp sand can be secured.

I am anxious to know what equipment and methods would be required to most economically remove this sand from the beach and place the same in trucks on the roadway, as shown.

Thanking you for any suggestion you may offer, I am,

Respectfully yours,
COUNTY SURVEYOR.

The most economical method and equipment for excavating, transporting and loading beach sand depends on whether it is meant to be the most economical in installation only or in cost per cubic yard for a given quantity handled, including entire cost of plant and operation, or for operating expense alone, without regard to cost of installation or salvage.

In either case, the cost cannot be estimated, and equipment and methods cannot be estimated, until several important factors are known, namely, the rate per hour at which the sand must be handled, the total amount to be handled and the kind of operating power available. The cost and methods will also be influenced in a lesser degree by the depth of cut, the character of material handled, the length of transportation, the height of hoists, the position and methods of loading, the plant or equipment available, and whether the plant is to be in temporary or in permanent operation.

ALTERNATIVE POSSIBILITIES

If a large amount of sand were to be excavated for a short period only, and a dredge or steam shovel were idle in the vicinity it might be most economical to use it and transfer the sand to the loading point on the highway or to build a ramp and extension of the road from the existing highway to the point of excavation and bring the trucks directly to the excavating machine. Almost any type of excavating plant might be utilized if special conditions made for specific economy, convenience, efficiency or rapidity or eliminated usual factors of cost. Ordinarily, however, they would not be best adapted for this service.

DREDGES

If an hydraulic dredge were used, it could deliver without difficulty to the elevation of the highway and the trucks could be loaded by gravity in a tunnel under the storage pile. A bucket dredge could deliver to a belt conveyor if one happened to be conveniently available, that would discharge sand on top of a storage pile or into an elevated storage bin, but these methods would hardly be economical unless there was an unusually good opportunity to secure the equipment at much less than the ordinary cost of installation and operation, or unless the excavation was under water or there was a very large amount to be done. They would, however, be effective.

CABLEWAY FOR VERY EXTENSIVE OUTPUT

If a very large quantity of sand was required and if, as is frequently the case on the lake shore, the deposit extended indefinitely beyond the limits of the 600-foot section indicated, it might be possible to handle it for a small unit cost by an excavating bucket operated from a cableway with movable towers traveling parallel to the shore line, an arrangement that would command all parts of an unlimited area and would elevate the sand to any required height for storage or chuting to delivery, but would involve a very heavy installation cost.

A hoisting and conveying bucket of any capacity can be handled on a semi-stationery cableway of 400 to 600 feet span, located in any required position on the area to be excavated. This cableway can be provided with a fixed head tower at the end of the highway with a mast, shear leg or other support for the tail tower. The cableway can serve and be located in any line and can be shifted readily by moving the tail tower and tail anchorage only, thus eventually covering all of the area and providing for the hoisting, conveying and dumping of the bucket that can deliver to a storage pile, to elevated storage bins, or directly to trucks.

Ordinarily the bucket would be filled by hand and it would be possible at considerable additional expense to apply the drag-line principle to filling the buckets with power furnished from the head tower of the cableway. This method might utilize the plant occasionally installed for handling spoil in sewer trenches, but is open to objection on account of the time and cost of shifting the tail tower and the cost of filling the bucket. In the sewer trench equipment the cableway moves parallel to itself, usually nearly the whole length of span at each shift and would thus command the 10-foot strip of coarse sand at the water's edge in this case. Of course the cableway might also be moved transversely to its length

and thus command also the 150-foot area of fine sand.

MECHANICAL LOADERS

The sand can, of course, be excavated by a standard elevating grader such as is used on road work, and which requires trucks to be continually moving alongside to receive the sand as it is discharged from the machine. This means the maintenance of a truck road from the end of the highway to different points of the sand pit.

If only the surface sand, above ground water line, is to be removed, it could probably be excavated and piled in long windrows by a road scraper or plow hauled by a tractor or heavy automobile truck, and loaded from the windrow into trucks by any of the several types of locomotive wagon loaders that could be used single or in multiple to give any required daily output. This, however, would involve the operation of the trucks from the highway to the loading machine, a feature which could easily be provided for by constructing a ramp and a corduroy road or even a rail track.

DERRICKS AND GRAB-BUCKET

Within a short distance of the loading point the sand could be excavated by clam-shell or orange-peel bucket operated from the long boom of a derrick and delivered directly to the trucks or to storage piles or storage bins and as the distance from the point of excavating to the point of loading increased, a very much greater area could be commanded by the installation of a second long boom derrick to handle the excavating bucket and transfer it to the other derrick serving the loading point, or to a trolley running by gravity on an inclined fixed cable and returned by a counterweight. These methods, however, and others that might be suggested, are more or less special, and would hardly be desirable unless the particular conditions involved made them unusually cheap or convenient.

DRAG-LINE SCRAPER BUCKET

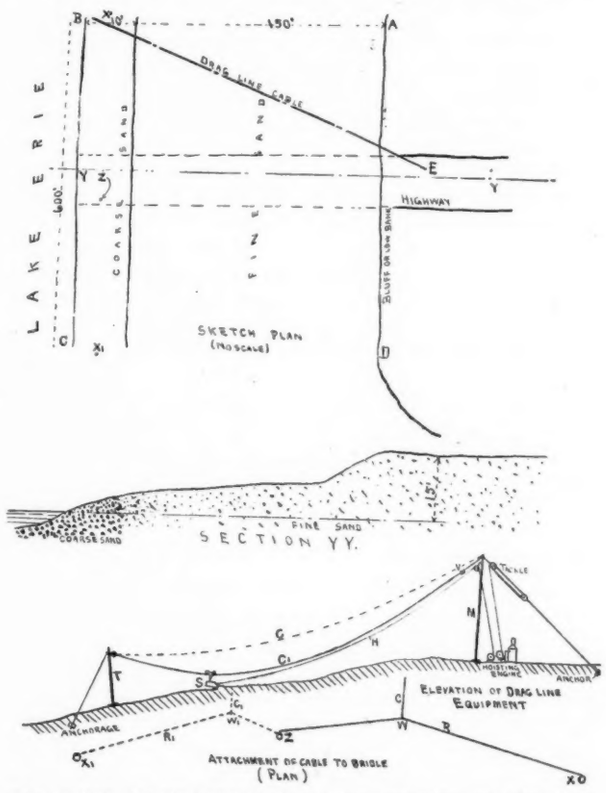
For ordinary conditions and an output of from 100 to 300 yards of dry, loose sand per day, excavated from the 150 x 600-foot area delivered at height of 10 or 20 feet above the surface of the ground at the middle of one of the long sides of the lot as indicated by the sketch, a drag-line scraper bucket plant is probably the simplest, the most quickly installed, the most easily operated, and the cheapest in original cost of installation and operating expense. It is not, however, suited to distances of more than 400 or 500 feet, or to the use of a very large excavating bucket, thus limiting the advantageous capacity from about 150 to 300 yards per day.

A very simple and efficient drag-line plant can be installed with the power located at E, on or near the roadway and the other end of a 400 or 500-foot cable located successively at different points on the two ends and along the shore line of the sand pit. The cable, made of plow steel, may have a diameter of about 1¼ inches and is supported at both ends on the tops of masts beyond which it is continued in the same plane to anchorages.

Both masts are properly guyed and both ends of the cables are secured to some stable objects, such as trees, heavy weights, or usually to dead men consisting of piles driven in the ground or buried timbers. The mast at the roadway is perhaps from 50 to 80 feet in height and near its top, on either side, the cable is connected to an adjusting tackle that permits the length of the cable to be varied during operation. The lead line from this tackle and the hauling line from the excavating bucket that is suspended from the cable are operated by a two-drum hoisting engine located on the ground near the foot of the main mast. The tail end of the cable is made fast directly to a dead man or to a bridle attached to two dead men or other anchorages.

The operating line of the drag-line bucket is made fast to the bucket and passes over a sheave at the top of the main mast and thence to the hoisting engine. A bucket of ½, ¾ or 1-yard capacity is suspended at a fixed distance below the trolley running on the main cable, and when filled by operating the hauling line is pulled upon the main cable by the continued operation of the hauling line until the bucket is dumped by coming in contact with a tripper attached to the cable above the storage or loading place.

After the bucket is emptied, the hauling line is allowed to overhaul and the bucket returns by gravity to the point where it is desired to fill it. The overhaul is then stopped and the adjustment tackle in the main cable is slacked off allowing the cable itself to sag until the bucket rests on the ground. The bucket is then dragged forward by the hauling line until it has filled itself, when



LOCATION OF DRAGLINE SCRAPER BUCKET PLANT AND DIAGRAMS OF ITS OPERATION

the adjustment tackle is again operated to take up the slack and make the cable taut, after which the bucket line is operated to haul the filled bucket on the cableway until it engages the tripper and is dumped, and so on, all of the work being done by two ordinary drums of a hoisting engine.

When all of the sand has been excavated in the plane of the cable, the tail end of the cable is shifted to a connection at another point on the bridle, all of the sand within reach is excavated, and the cable is shifted again, and so on, until the tail line has moved from end to end of the bridle. One end of the bridle is then detached from its anchorage, moved forward and attached to another anchorage and the cable is advanced step by step from end to end of the bridle and so on, as the work advances covering a maximum area of a complete circle with the main mast as a center and the full length of the cable as radius.

The end of the cable can have a fixed attachment to the bridle or it can have a movable connection adjusted by a hand windlass at one end of the bridle. The bridle is up to 100 feet long, and will provide for several positions of the cable and reduce the amount of shifting to a minimum.

DRAG-LINE EQUIPMENT

The main mast should be properly designed and fitted with guys, sheaves and other attachments designed for the specific requirements of the case.

The hoisting engine, although of standard double-drum type, is subjected to much heavier strain than in ordinary derrick work and it has been found that one suitable to withstand the stresses developed by the operation of a 1-yard scraper bucket will probably weigh 75 per cent more than one for ordinary service.

For handling a 1-yard bucket it will require a steam boiler of about 75 h. p. capacity or an A. C. electric motor of about 100 h. p. rating. The outfit will probably cost less than an ordinary sewer trench cableway of 500 feet span, and should have a capacity of 200 yards or more per day under favorable conditions.

Drag-line scrapers, cableways, masts and hoisting engines are designed, manufactured and installed by Sauerman Brothers, 1138 Monadnock block, Chicago, and by the Lidgerwood Manufacturing Company, 96 Liberty street, New York, both of whom maintain engineering staffs that are always available to answer inquiries, make estimates, design apparatus and advise concerning the selection and operation of plant and equipment. Under present conditions, when all manufacturers are desirous to keep their shops in operation, there is no doubt that very close prices will be quoted and equipment furnished as quickly and reasonably as possible.

SPECIFIC INSTALLATION AND OPERATION

The accompanying plan and cross section YY indicate the general character and dimensions of the location where the sand is to be excavated and loaded. The drag-line scraper may be installed with the main mast in the highway at E and tail mast at B and from its position where the main mast remains stationary the tail mast can be moved from B to A and from E to C and from C to D, thus covering the entire area.

If, however, it is desired to excavate only the long 10-foot stretch of coarse sand, the arrangement will be more efficient if changed so that the head mast is located at the point Z in the middle of the strip and the tail mast at X at one end. This will enable all of the sand between X and Z to be excavated and conveyed to Z and there delivered to the trucks arriving and departing on an extension of the highway carried from the bank to the lake shore for this purpose, as indicated by dotted lines. After this part of the sand has been excavated, the tail mast may be moved to the point X at the opposite end, while the main mast remains fixed and the sand between Z and X_1 can be excavated and loaded as before.

The sketch marked elevation of drag-line equipment illustrates the operation of drag-line EB previously explained and shown on the general plan diagram. In it M is the main mast and T the tail mast, both of them high enough to give the required elevation to the drag-line scraper buckets and hoist the material to a position from which it can be dumped to trucks or storage near the mast end and directly below the stop or trigger V on the cable which automatically dumps the contents of the bucket, when engaged by the latter.

The main cable C is hauled into the flat curve with considerable tension by operating the tackle led to the hoisting engine. When in this position the bucket S is run by gravity to a position vertically above the point at which it is required to excavate. The tackle is then slacked off, allowing the main cable to drop to position C_1, and permitting the scraper bucket to rest on the ground as shown. The hauling line H, which is attached to the bucket, passes over a sheave at the top of the mast and down to the hoisting engine, is then operated, causing the bucket to advance and fill itself, after which the tackle is again operated, pulling the cable back to position C, and thus providing a rigid support on which the bucket is pulled up to the trigger V by the continued action of the hauling line H. The bucket automatically dumps at this point and returns to the excavating position, the main cable drops to C_1, and so on, the operations being repeated over and over again.

In the figure showing the attachment of the cable to the bridle, the bridle R, any convenient rope or cable up to 100 feet long, is attached to piles, dead men, anchorages or masts X and Z and the cable C is attached to the bridle at any desired point W and maintained there until it is desired to shift the position of the cable when the attachment is moved forward to some other point between Z and X and again made fast, and so on. The movement either being made along the bridle by means of a special connection and windlass attached to one of the points of support or by an independent attachment made and shifted by hand from time to time. After the main cable has moved from X to Z the attachment of the bridle to anchorage X is removed and the end of the bridle is shifted to anchorage X_1, where it is made fast and the cable attached at any position W_1, to the bridle in its new position R_1, and so on, thus permitting the cable to move continuously from anchorage to anchorage with the minimum trouble and delay.

NEWS OF THE SOCIETIES

March 9—VERMONT SOCIETY OF ENGINEERS. Annual meeting. Hotel Vermont, Burlington, Vt.

March 9 — NEW ENGLAND WATER WORKS ASSOCIATION. Copley Square Hotel, Boston. Secretary, Frank J. Gifford, Dedham, Mass.

March. 10—ENGINEERS' CLUB OF TRENTON. Trenton, N. J.

March 10—TRI-CITIES SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Rock Island, Ill. Chamber of Commerce.

March 11 — ROCHESTER N. Y. ENGINEERING SOCIETY.

March 11—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Engineering Societies Building, New York City.

March 14—WATERBURY, CONN., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

March 14—AMERICAN ASSOCIATION OF ENGINEERS. The third annual railroad conference. Chicago.

March 14-16—INDIANA SOCIETY OF SANITARY ENGINEERS. Muncie, Ind.

March 15-17 — AMERICAN RAILWAY ENGINEERING ASSOCIATION. Chicago.

March 17—BRIDGEPORT, CONN., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Chamber of Commerce.

March 18—SCHENECTADY SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

March 22—PHILADELPHIA, PA., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineer's Club.

March 22—ATLANTA, GA., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Carnegie Library, Atlanta.

March 22—BALTIMORE, MD., SECTION. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineers' Club.

March 23-24—AMERICAN WATER WORKS ASSOCIATION. Illinois Section. Annual meeting, Chicago, C. C. Habermeyer, Secretary, Urbana, Ill.

March 25—COLORADO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Metropole Hotel, Denver.

March 25—METROPOLITAN SECTION. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineering Society Building, New York City.

March 30—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Directors' meeting. Atlanta, Ga. Secretary, James T. Mulcahey, Yonkers, N. Y.

April 11 — HARTFORD SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. City Club, Hartford, Conn.

April 16—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Joint meeting with the Association of Iron and Steel Electrical Engineers. Pittsburgh, Pa.

April 18-23 — UNITED STATES GOOD ROADS ASSOCIATION. Greensboro, N. C.

April 21-22—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. 5th annual convention. Greensboro, N. C. Secretary, J. A. Routree, Birmingham, Ala.

April 22—BIRMINGHAM SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting with Atlanta, Birmingham and New Orleans sections, with members of Council present. Battle House, Mobile, Ala.

April 27—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Houston, Texas.

April 27-29—UNITED STATES CHAMBER OF COMMERCE. 9th annual meeting. Atlantic City, N. J.

April 28-29—MID-CONTINENT SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting of Chemical Eng. Societies. City Auditorium or Convention Hall, Tulsa, Okla.

April 29 — COLORADO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Metropole Hotel.

May 2-4—MISSISSIPPI VALLEY ASSOCIATION. 3d annual convention. New Orleans, La.
TRADE CONVENTION. 8th convention.

May 4-7 — NATIONAL FOREIGN TRADE CONVENTION. Cleveland, Ohio.

May 9-11 — AMERICAN ASSOCIATION OF ENGINEERS. 7th annual convention. Buffalo.

May 9-12—SOUNTHWEST WATER WORKS ASSOCIATION. Shirvin Hotel Headquarters, Oklahoma City, Okla.

May 9-12 — SOUTH-WEST WATER WORKS ASSOCIATION. Oklahoma City. Headquarters Skirvin Hotel.

May 17-19—NATIONAL FIREMEN'S ASSOCIATION. Twenty-third annual convention. Fort Wayne ,Ind.

June—CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS, State of N. Y. 12th Annual Conference. Elmira, N. Y.

June 6-10—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Cleveland, Ohio. Secretary, J. M. Diven, 153 West 71st St., New York.

June 7-9—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting. San Francisco, Cal.

Oct. — IOWA SECTION AMERICAN WATER WORKS ASSOCIATION. Seventh annual meeting.

AMERICAN WATER WORKS ASSOCIATION, NEW YORK SECTION

A meeting of this section was held on Wednesday, February 16, at the Hotel McAlpin, New York, in the form of a luncheon and inspection and discussion of moving pictures showing trenching machines such as can be used in laying water mains. Lantern slides were shown by the Bucyrus Co. and the Marion Co., showing their steam shovels used in trenching for various purposes. The Parsons trenching machine and the Austin machine were shown in moving pictures which illustrated clearly methods of operating in city streets as well as open country. Following the pictures, questions were asked and experiences with trench digging machines were given by Messrs. Diven, Ackerman and two or three other members.

As member of the governing committee, in place of William W. Brush, whose term of office is expiring, the section elected Burt B. Hodgman.

NATIONAL FEDERATION OF CONSTRUCTION INDUSTRIES

The National Construction Conference called by the National Federation of Construction Industries was held March 2 and 3 at the Hotel Sherman, Chicago. The conference was announced to be for the purpose of taking steps to place the construction industry upon a more sound economic basis, and to inspire renewed activity in such industries upon improved conditions. The principal objects were, specifically:

To place construction materials upon a less erratic and more substantial basis of prices than now exists in many instances.

To set up machinery whereby adjustment may be made in labor costs, which will more properly accord with present conditions.

To develop modifications in the conditions surrounding the financing of the construction industries, which will tend to make more ready the supply of funds for this class of industry.

To make improvements in the relations between employers and employes, which will tend to secure the continuity of operations and a more satisfactory production in construction.

To aid employers and contractors in effecting such further deflation of values throughout the construction industries (and all stages thereof, from raw materials to finished products), including their own overhead and profit, as is required under present conditions.

AMERICAN ASSOCIATION OF ENGINEERS

A meeting of the National Engineering Conference on Public Information was held in the Congress Hotel, Chicago, February 25. Papers were presented on "Teaching Engineering Journalism at Iowa State College," by H. E. Pride, Bulletin Editor, Iowa Engineering Experiment Station, Ames. "The Necessity for Public Information in the Municipal Field," by S. C. Hadden, Editor of *Municipal and County Engineering*, Chicago. "Essentials of Popular Scientific Writing," by Alexander Black, Editor of the Newspaper Feature Service, New York. "The Value to a Young Engineer of Technical Press Contributions," by C. A. Tupper, President of the International Trade Press, Chicago. "Discussion on the Value of Technical and Engineering Press Bulletins." "Some Problems Before the Engineer," by John G. D. Mack, State Chief Engineer, Madison, Wis. "A National Program of Public Information," by W. W. DeBerard, Western Editor of *Engineering News-Record*, Chicago. "Ambassadors to His Majesty, the Public," by C. R. Thomas, in charge of Publication of Results, Forest Products Laboratory, Madison, Wis. "Engineering Information Service in Iowa," by R. W. Crum, Engineer of Materials and Tests, State Highway Commission, Ames, Iowa. "Making Easy Reading of Engineering Subjects," by C. S. Darling, Managing Editor of *Factory*, Chicago. "What Publicity Does for the Chapter," by R. C. Bailey, Assistant Secretary, American Association of Engineers. "The Difference Between 'Publicity' and News," by Harvey V. Deuell, of the *Chicago Tribune*. "The Meaning and Purpose of Publicity," by Ivy L. Lee, Advisor in Public Relations to the Pennsylvania Railroad and other interests. "Making Publicity Out of Policies," by Richard H. Waldo, Publisher of *Hearst's Magazine*, New York. "The Public's Debt to the Engineer," by F. M. Feiker, VicePresident of the McGraw-Hill Publishing Company, New York.

The subjects announced for discussion included: Shall we drop the term "publicity"? Germinating the public-

ity idea in the colleges. How can the technical press help disseminate public information? How can we stimulate the writing of special feature articles? Will publicity pay as a career? How publicity helps a community. How publicity helps a local society. Engineering publicity from the standpoint of the newspaper editor.

AMERICAN CONCRETE INSTITUTE

At the seventeenth annual convention of the American Concrete Institute held in Chicago on February 14, 15 and 16, technical subjects covering all phases of concrete were discussed. The meeting opened with an address on the "Aims and Activities of the Institute," by President H. C. Turner, and this was followed by a report by W. K. Hatt, a talk by W. A. Hull on "Recommendations for Safeguards Against Unusual Fire Hazards," papers by W. K. Hatt on "Tests of a Concrete Mixer," F. M. Balsley on "Equipment for Concrete Road Construction," C. R. Ege on "Developments in Construction Plant and Organization in Concrete Road Construction," and many other interesting discussions. Officers for the ensuing year are: President, H. C. Turner; secretary-treasurer, Harvey Whipple; vice-president, W. P. Anderson; and directors, Ernest Ashton, J. C. Pearson and D. A. Abrams.

IDAHO CHAPTER, AMERICAN ASSOCIATION OF ENGINEERS

The first annual convention of the Idaho Society of Engineers after it became a chapter of the A. A. E. was held on January 10-11 at Nampa. Action was taken requesting Congress to enact legislation to provide for the continuation of Federal Aid for highway work and for a National Department of Public Works. The following officers were elected for the ensuing year: President, Lee R. Cooke; vice-presidents, E. E. Moberly and J. H. Wilson; secretary-treasurer, Capt. E. F. Ayres; and executive committee, E. B. Darlington, Dr. C. N. Little and Barry Dibble.

ILLINOIS SOCIETY OF ENGINEERS

The annual meeting of the Illinois Society of Engineers was held in Chicago on January 26-28. A new feature of the meeting was the award of prizes for the best papers by writers of not more than five years' membership. The following men received prizes: Harlan H. Edwards, city engineer, Danville, Ill., for his paper, "Keeping Our Streets Smooth," and Allen Dimmick, of the Texas Co., Chicago, for his "Asphalt Pavements of the Future."

Officers for 1921 are: President, Samuel A. Greeley; vice-president, Robert I. Randolph; secretary, E. E. R. Tratman. The next meeting is to be held in Decatur, Ill., in January, 1922.

UTAH IRRIGATION AND DRAINAGE CONGRESS

At its fourth annual convention in Salt Lake City, January 17-18, the Utah Irrigation and Drainage Congress elected the following officers: President, Dr. F. S. Harris; first vice-president, R. E. Caldwell; second vice-president, E. A. Porter; third vice-president, Ephraim Bergeson; and secretary-treasurer, U. A. C. Logan.

LOUISIANA ENGINEERING SOCIETY

The regular meeting of the Louisiana Engineering Society was held at New Orleans on February 14. The technical exercises of the evening consisted of a paper, "Straightening a Large Shaft by the Heat Process," by Mr. Frank G. Frost, and an informal talk on coal handling machinery and cranes, illustrated by motion pictures, by Mr. Griess of the McMyler-Interstate Co., Cleveland.

INDIANAPOLIS CHAPTER, AMERICAN ASSOCIATION OF ENGINEERS

At the meeting on February 16, the chapter was addressed on "A Score Card for Engineers," by Dean Potter, of Purdue University. This talk related to a new method of rating students to encourage greater activities in university and engineering work, and the whole subject of engineering education was opened for questions and arguments.

The subject for the March 1 meeting will be "Some Recent Developments in Concrete," which will be discussed by Lieut.-Col. Boyden, of the Portland Cement Association.

ENGINEERING INSTITUTE OF CANADA

The 35th annual general and professional meeting of the E. I. C. was held at Toronto on February 1-3. There was a large attendance and all enjoyed the many social features of the meetings.

The council report showed the institute to be flourishing. There was a treasury surplus reported of over $6,000, and the membership has increased to a total of over 4,000. Two new branches have been added—one at Monckton, N. B., and the other at Sydney, N. B. Proposed amendments to the by-laws were discussed, and the discipline provisions were enlarged, and the fees raised. Prizes were awarded for the current year to E. E. Campbell, J. C. Nicol, Dr. A. Stansfield, R. deL. French and J. R. Dunbar.

The following officers were elected for the ensuing year: President, John M. R. Fairbairn; vice-presidents, H. G. Acres and Walter J. Francis. The secretary of the institute is Fraser S. Keith, 176 Mansfield street, Montreal.

NEW JERSEY SEWAGE WORKS ASSOCIATION

The annual meeting of the New Jersey Sewage Works Association was held on February 18. The following subjects were discussed: "Sewage Siphons," by Weston Gavett; "Certain Phases of the Biology of Sewage Disposal," by Thomas J. Headlee; "Practical Operating Data on Imhoff Tanks and Screens," by John Downes; and "The Design and Operation of Single-Story Tanks," by C. M. Nichols. There was also an open discussion on assessment methods for new sewers.

TOPEKA ENGINEERS CLUB

At its annual meeting on January 31, the Topeka Engineers' Club elected the following officers: President, M. W. Watson; first vice-president, A. B. Griggs; second vice-president, R. W. Epps; secretary, P. J. Carter; and treasurer, Roy Finney.

PERSONALS

Comer, R. O., has been placed in charge of canal and lock work on the Navigation Canal.

Hunt, J. R., has been appointed road engineer of Wyoming county, W. Va.

Smith, E. S., formerly Director of Public Service at Youngstown, Ohio, has been appointed chief engineer of the Ohio State Highway Commission.

Freeman, Roger M., for the past few years supervising engineer of the Bureau of Yards and Docks, U. S. Navy, has opened an office in New York City as construction engineer, specializing in the design and construction of industrial buildings, steel plants and power plants.

Herrick, Leon C., of Norwalk, Ohio, has been appointed State Highway Commissioner of Ohio.

Gibson, W. S., of St. Thomas, Ont., has resigned from the engineering staff of the Ontario Department of Highways, and will be succeeded by S. F. Hanning.

Bintz, W., formerly structural engineer of the Flint, Mich., Engineering Department, has accepted a similar position at Lansing, Mich.

Hayes, F. B., has been appointed city engineer of Pendleton, Ore.

Dimock, A. H., city engineer of Seattle, has been reappointed for a three-year term.

Leo, John P., chairman of the Board of Standards and Appeals, has been appointed commissioner of street cleaning, New York City, to succeed Arnold B. MacStay.

Giesecke, Prof. F. E., head of the engineering division of the bureau of economic geology and technology, University of Texas, has been appointed chairman of the problem committee, Federal Highway Council, Washington, D. C.

Babcock, Dudley P., formerly assistant engineer of the New York State Highway Commission, is now assistant engineer, Bronx Parkway Commission, Bronxville, N. Y.

Jackson, Jesse A., who has been in the employ of the Seattle engineering department since 1902, has been appointed engineer of the Seattle City Zoning Commission and is developing a plan for laying out the city in zones.

Levin, Louis S., formerly engineer of Allegan county, Michigan, has been appointed roads engineer of Chippewa county.

Brooks, Clarence M., formerly of the New Hampshire State Highway Department, is now highway commissioner of Vermont.

Smyth, Sid, has been reappointed engineer of Cochise county, Ariz., for a term of two years.

Harrison, Major W. B., Corps of Engineers, U. S. A., has been ordered to serve with the 11th Engineers in the Canal Zone.

Groot, E. H., has been made assistant engineer in charge of the Louisville & Portland Canal.

Smith, Eliot N., for nine years on the engineering staff of the Catskill aqueduct, Board of Water Supply, New York City, died recently.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

EARLE CENTRIFUGAL PUMPS

The centrifugal pumps built by the Earle Gear and Machine Company comprise a full line of high-grade single and multi-stage pumps from 2-inch to 14-inch size for any type drive, from slow speed steam or gas engines to high speed steam turbines. They are built for any conditions for which centrifugals of the better class are adapted, except for deep well pumping.

This company was among the pioneers in the development of the modern centrifugal pump and has kept pace with the very rapid improvement in design during the past decade.

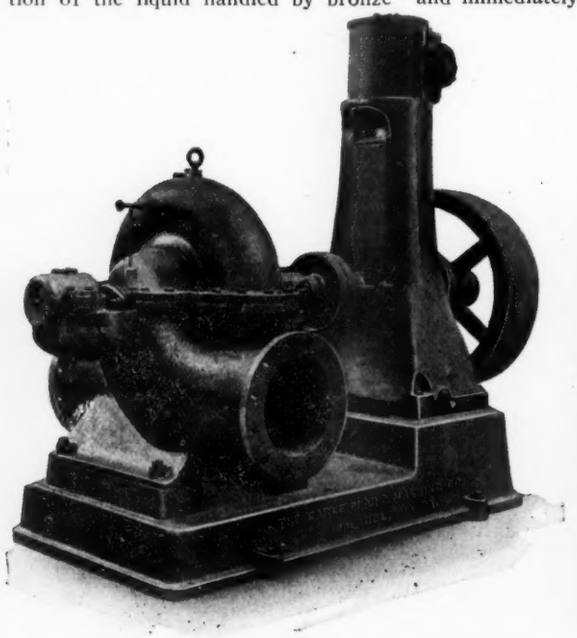
Earle pumps having all the good points of any other make, as well as some special features, comprise, when direct connected to a driving unit of proper size and type, a pumping outfit which is low in first cost, requires little foundation, is noiseless in operation, operates with minimum of attendance and repairs, and maintains its original high efficiency indefinitely.

Both single stage and multi-stage type have horizontally split casings with both suction and discharge openings in the lower half of the casing, thus permitting the complete dismantling of the pump without disturbing the piping connections. The construction of the bearing brackets integral with the lower half of the casing secures the permanent alignment of all parts of the pump with the shaft center line. All bearings are ring oiling, of liberal size, and are split vertically so that by a quarter turn they can be easily removed without displacing the shaft.

The shaft is protected from the action of the liquid handled by bronze sleeves, carried through the stuffing boxes which are provided with bronze water seal rings packed on both sides. The impellers are of bronze, enclosed type, fitted with removable wearing rings of the step type originated by the Earle Gear and Machine Company. The flexible couplings have steel pins in one-half which engage steel lined rubber bushings in the other half.

The multi-stage pumps are of the tried and proven type, with impellers all faced one way to obtain the shortest and smoothest water passages between impellers. The end thrust, which is practically the only undesirable feature of this type, is, in the Earle pumps, entirely eliminated by means of the "Simplex Pump Balance," a recently patented device which automatically counteracts the end thrust and continues to do so throughout the life of the pump.

This type of pump is particularly suitable for boiler feeding, or for any high-pressure pumping requirements.



EARLE CENTRIFUGAL PUMP

ROSS HYDRANT THAWING DEVICE

The Ross hydrant thawing device has been perfected and is now placed on the market by the American-La France Fire Engine Co. This thawing device is simple in construction, compact in design and effective in operation.

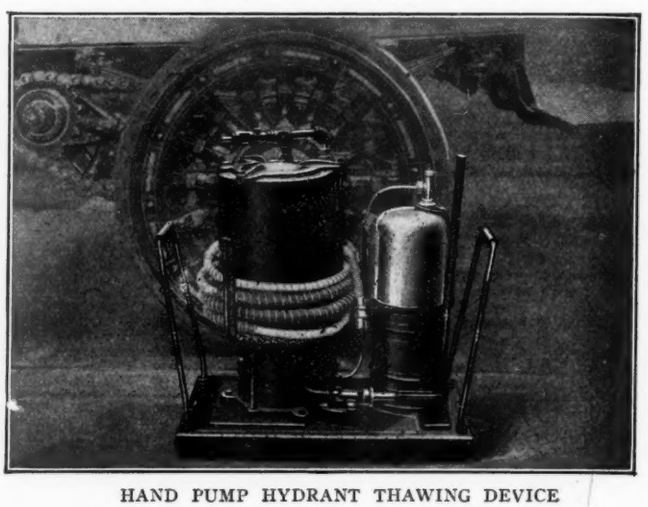
It consists essentially of a steam coil surrounded by a jacket tank, which is filled with water for pumping into the steam coil. By means of a hand-operated pump, water can be forced from the tank into the coils and by regulating this feel either wet or super-heated steam can be secured at the nozzle. Water is fed continuously into the coil and immediately converted into steam.

The heat is produced from a standard Presto-lite style B tank carried with the outfit. Although it is impossible for this boiled to explode in ordinary operation a safety valve is provided against any unforeseen condition.

The steam is led through 15 feet of flexible metallic hose with a braided steel jacket covered for over half its length with asbestos, which in turn is protected by a canvas cover, and the whole wrapping bound with wire.

The entire thawing device weighs only 135 pounds completely charged ready for service. It is 28 inches across the base, 12 inches wide and 25 inches high.

The portability, the fact that the boiler is not dependent upon an outside source of heat, and the remarkable rapidity with which steam is produced, make this thawing device of general value and unusual practicability and of particular benefit to fire departments.



HAND PUMP HYDRANT THAWING DEVICE

STANDARDIZED SECTIONAL STEEL BUILDINGS

The Steel Fabricated Corporation makes a specialty of the construction of standardized sectional steel buildings for industrial uses. They are built with standard type single span trusses 8, 10, 12, 16, 20, 24 and 30 feet long, with side-wall sections 8 or 10 feet high and, in the heavy type, with single truss spans of 20, 24, 30, 32 and 40 feet and side-wall sections 10, 12 or 16 feet high.

Both types are one-story structures furnished in multiples of 8-foot lengths with frames made of riveted steel shapes covered with corrugated steel riveted to them . They may be placed on wood or concrete foundations and are furnished with sliding or swinging doors. The roof trusses are of the compound Fink type, and erection diagrams are provided by which the buildings can be assembled with common labor. A 40 x 496-foot building was erected in four working days. The buildings can be easily knocked down and re-erected and are recommended for a large number of industrial purposes.